

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

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In the Matter of the Application of)
HAWAII ELECTRIC LIGHT COMPANY, INC.)
For Approval to Commit Funds)
in Excess of \$500,000 for)
Item H0000850, HELCO's Puueo)
Hydroelectric Plant Rehabilitation)
Project.)

DIV. OF CONSUMER ADVOCACY
DEPT. OF COMMERCE AND
CONSUMER AFFAIRS
STATE OF HAWAII
DOCKET NO. 03-0222

DECISION AND ORDER NO. 20639

Filed Nov. 14, 2003
At 11:00 o'clock A.M.

Karen Higashi.
Chief Clerk of the Commission

ATTEST: A True Copy
KAREN HIGASHI
Chief Clerk, Public Utilities
Commission, State of Hawaii.

K. Higashi.

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DECISION AND ORDER

I.

Background

HAWAII ELECTRIC LIGHT COMPANY, INC. ("HELCO") requests the commission's approval to commit approximately \$3,450,000 to undertake and complete the Puueo Hydroelectric Plant Rehabilitation project ("project").¹ HELCO makes its request in accordance with Section 2.3.g.2 of General Order No. 7, *Standards for Electric Utility Service in the State of Hawaii*.

HELCO served copies of its application upon the Department of Commerce and Consumer Affairs, Division of Consumer Advocacy ("Consumer Advocate"). HELCO responded to the Consumer Advocate's and commission's information requests, on October 16 and 20, 2003, respectively, and to the Consumer Advocate's supplemental information requests on October 30, 2003.

¹See application, filed on August 18, 2003.

The Consumer Advocate does not object to the commission's approval of HELCO's application.²

II.

Puueo Hydroelectric Plant

A.

HELCO's Puueo plant is a 2,250 kilowatt ("kW") capacity run-of-the-river hydroelectric plant ("Puueo plant" or "hydroelectric plant"), located near the mouth of the Wailuku river at the north end of Hilo, island of Hawaii. The Puueo plant consists of: (1) a diversion and intake structure, located upstream of Rainbow Falls; (2) a 7,231 foot-long buried steel penstock that traverses former sugar cane fields along the north side of Wailuku river; and (3) two generating units, Units No. 1 and No. 2, in two adjacent powerhouse buildings.³

HELCO explains the Puueo plant's construction and repair history as follows:

1. The Puueo plant was first built in 1910.
2. Unit No. 1, a 750 kW unit, was installed in 1919. Unit No. 2, a 1,500 kW unit, was installed in 1941. Also in 1941, the original penstock was replaced with a buried welded steel pipeline.

²Consumer Advocate's position statement, filed on October 31, 2003.

³See Exhibit 1, Figure 3-1, entitled "Project Map," attached to the application.

3. In 1998, "HELCO rehabilitated the intakes and penstocks for the Puueo hydroelectric plant, including relining the penstock with cement mortar and repair of selected areas."⁴

4. Unit No. 2 is a 1,500 kW double nozzle, double runner, Pelton turbine generator unit. On September 3, 2002, at approximately 10:30 a.m., Unit No. 2 failed, "causing severe damage to the unit's twin turbines and generator." Although the exact cause of Unit No. 2's failure is unknown, HELCO's investigation "indicate[s] a possible loss of a turbine bucket that led to high vibration and eventual bearing failure."

B.

HELCO retained Christensen Associates Inc. of California ("CAI") to: (1) complete an engineering and financial review of the options for the rehabilitation of generating equipment at the hydroelectric plant; and (2) "prepare a report to assist HELCO in deciding how to best proceed to restore the lost capacity[.]" CAI's report, entitled *HELCO Puueo Hydroelectric Power Plant Unit No. 2: Evaluation of Rehabilitation Options, Final Report, May 2003*, is attached as Exhibit 1 to the application.

CAI evaluated three options for HELCO's consideration:

1. Repair the damaged Unit No. 2 and refurbish the existing Unit No. 1;
2. Replace the damaged Unit No. 2 with a unit of similar capacity and refurbish the existing Unit No. 1; and

⁴See Docket No. 98-0027, *In re HELCO*.

3. Repower Units No. 1 and No. 2 by installing a new, larger unit inside Unit No. 2's powerhouse to replace the damaged Unit No. 2 and existing Unit No. 1.

CAI's recommendation to HELCO "is to repower Units 1 and 2 by installing a modern, efficient turbine generator[,]" i.e., Option No. 3. Given the hydroelectric plant's hydraulic head and the available flow of water, CAI finds that "either a Pelton or Turgo type of impulse turbine is feasible for the Puueo hydroelectric plant." In this respect, HELCO explains that:

1. In a Pelton impulse turbine, the turbine runner is propelled by jets of water striking a series of buckets that are evenly spaced around its perimeter. The jets are orthogonal to the turbine shaft.
2. In a Turgo impulse turbine, the turbine runner is propelled by jets of water striking curved vanes within the runner. The jets are inclined relative to the turbine shaft.

CAI concludes that the Turgo impulse turbine design for repowering Unit No. 2 "appears to best meet HELCO's goal of providing efficient, reliable electric service to its customers at the lowest reasonable cost in both the short term (i.e. initial revenue requirements) and the long term (i.e. present values of estimated life cycle costs and long term revenue requirements)."

HELCO, following its review of CAI's report, concurs with the recommendation to proceed with Option No. 3.

C.

HELCO states that the project "involves the rehabilitation of the Puueo hydroelectric plant by replacing Unit

No. 2 with a modern, more efficient turbine generator." Specifically, the damaged 1,500 kW Unit No. 2 will be removed and a larger, 2,280 kW to 2,400 kW turbine and associated electrical and control equipment will be installed in its place.

The project's scope of work will include:

1. Engineering and project management services.
2. Preparing the foundation for the new turbine.
3. Temporary modifications to the powerhouse building and distribution wiring to allow for installation and construction activities.
4. The purchase and installation of:
 - A. New switchgear, batteries, a step-up transformer, SCADA interface and controls, and associated wiring;
 - B. A voltage regulator and static exciter; and
 - C. A new turbine and electrical generator with electronic governor controls.
5. Commissioning and testing.

HELCO plans to seek competitive bid proposals for the project's equipment and construction. The project's estimated cost, approximately \$3,450,000, is based on the cost estimates for Option No. 3, the Turgo design. Nonetheless, "the type of machine [Turgo or Pelton] HELCO ultimately selects will be determined after equipment bids are received and evaluated."

Based on a December 2003 construction start-up date and a sixteen (16)-month implementation schedule, HELCO's estimated in-service date of the re-powered unit is early 2005.

D.

Once the new, larger unit is installed at the Puueo plant, HELCO plans to either:

1. Maintain Unit No. 1 in a standby mode;
2. Operate Unit No. 1 when river flows are below critical minimums for the new, larger unit, but are still at an operational level for Unit No. 1;
3. Relocate Unit No. 1 to another site within HELCO's system, following additional rehabilitation; or
4. Sell the unit to a third-party.

III.

Discussion

A.

HELCO provides the following justification for the project:

1. All of the rehabilitation options evaluated by CAI are "more cost-effective than the present situation, i.e., Unit No. 2 shutdown and only Unit No. 1 in operation."
2. The baseline option of "doing nothing" is infeasible.
3. Both Units No. 1 and No. 2 have exceeded their useful service lives. Modern equipment is expected to increase the Puueo plant's power production, due to increased efficiency and reduced outages.
4. The rehabilitation of the hydroelectric plant "also best sustains diversification of HELCO's portfolio of

renewable energy resources." "Approximately 30% of the electricity on the island of Hawaii is generated from renewable energy resources with about 5% produced from hydroelectric power."

5. The output of the new turbine, at approximately 2,280 kW to 2,400 kW, will be more than the existing hydroelectric plant's output of 2,250 kW prior to the damage sustained to Unit No. 2, while using the same amount of water as before.

B.

HELCO states that the project is consistent with its Integrated Resource Plan, 1999 - 2018 ("IRP"). Specifically:

1. The IRP "explicitly assumes that existing non-fossil fuel, as-available energy resources, including the Puueo Hydro units, will continue to supply energy from renewable resources to HELCO's system."

2. The project "is consistent with the assumption that Puueo operations will continue during the planning period."

3. The project "pursues a cost-effective solution for rehabilitating an existing, as available, renewable resource, so that the resource can continue to supply energy from a renewable resource to HELCO's system."

C.

The Consumer Advocate examined the reasonableness of: (1) pursuing Option No. 3; and (2) the project's estimated cost.

The Consumer Advocate finds that:

1. "[T]he proposed repair, refurbishment or replacement of the units is necessary to continue operations of the Puueo hydroelectric generating unit."

2. Although HELCO has not evaluated the cost-effectiveness of the project in comparison to other renewable energy projects, the hydroelectric plant will assist HELCO and its affiliate utilities in meeting the renewable portfolio standards ("RPS") set forth in Hawaii Revised Statutes §§ 269-92 and 269-93.

3. CAI's economic analysis of the various alternatives appears reasonable.

4. HELCO, in hindsight, might have prevented Unit No. 2's operational failure with maintenance work previously recommended by CAI in 1994. Nonetheless, "[t]he Consumer Advocate recognizes that, without significant investment of resources, it would be speculative to ponder the continued operations of the Unit No. 2." Thus, the Consumer Advocate, "at this time, will not raise [or] pursue its concerns that actions may have been taken to prevent the failure of the Puueo Unit No. 2."

5. The project's estimated cost is based on CAI's cost estimate for Option No. 3. HELCO has not completed its competitive bid process for the construction and outside engineering costs. Thus, the Consumer Advocate is presently unable to assess the reasonableness of the project's estimated cost. The Consumer Advocate is able to better examine the

reasonableness of the project's final, actual cost "at the time of the final cost report or in [HELCO's] next rate proceeding if necessary."

The Consumer Advocate concludes that it "does not object to [the] Commission's approval of the proposal to repower the Puueo Unit Nos. 1 and 2." It notes that "with adequate maintenance and replacement of components, CAI expects the Puueo hydroelectric plant to operate for a significant number of years, contributing to HECO/HELCO/MECO's ability to meet the RPS goals established by the legislature."

D.

The commission finds that the project is reasonable and consistent with the public interest and HELCO's IRP. The commission, thus, will approve the expenditure of funds for the project.

The commission has concerns, however, regarding HELCO's failure to compare the cost-effectiveness of the project to the cost-effectiveness of other renewable energy projects in attempting to meet its RPS requirements. While the commission recognizes the importance of meeting the RPS requirements and in retaining existing renewable resources, such as the Puueo plant, it remains imperative that HELCO consider the available renewable alternatives for future projects of this type.

As the Consumer Advocate notes, there also appears to be possible deficiencies in HELCO's preventive maintenance program, which might otherwise have prevented Unit No. 2's

operational failure with maintenance work previously recommended by CAI in 1994. Recognizing that this issue is beyond the intended scope of this proceeding, the commission will separately examine the adequacy of HELCO's preventive maintenance program and its implementation.

IV.

Orders

THE COMMISSION ORDERS:


1. HELCO's request to expend an estimated \$3,450,000 for the Puueo Hydroelectric Plant Rehabilitation project is approved; provided that no part of the project may be included in HELCO's rate base unless and until the project is in fact installed, and is used and useful for public utility purposes.


2. HELCO shall submit a report within 60 days of the project's commercial operation, with an explanation of any deviation of 10 per cent or more in the project's cost from that estimated in the application. HELCO's failure to submit this report will constitute cause to limit the cost of the project, for ratemaking purposes, to that estimated in the application.

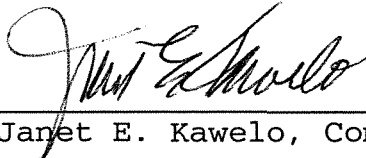
3. HELCO shall conform to all of the commission's orders set forth above. Failure to adhere to the commission's orders shall constitute cause for the commission to void this decision and order, and may result in further regulatory actions as authorized by law.

DONE at Honolulu, Hawaii this 14th day of November,
2003.

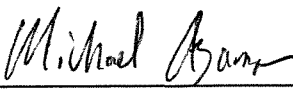
PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

By 
Carlito P. Caliboso, Chairman

By 
Wayne H. Kimura, Commissioner

By 
Janet E. Kawelo, Commissioner

APPROVED AS TO FORM:


Michael Azama
Commission Counsel

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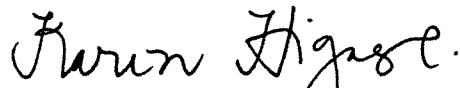
CERTIFICATE OF SERVICE

I hereby certify that I have this date served a copy of the foregoing Decision and Order No. 20639 upon the following parties, by causing a copy hereof to be mailed, postage prepaid, and properly addressed to each such party.

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DATED: November 14, 2003